WHAT IS CLAIMED IS:

1. A composition for forming a porous dielectric film, comprising:

(i) a siloxane-based resin precursor;

(ii) a condensation catalyst generator;

(iii) a pore-generating material; and

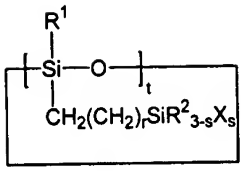
(iv) a solvent for dissolving the components (i)~(iii).

2. The composition according to claim 1, wherein the amount of the condensation catalyst generator is 0.1~20 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material).

3. The composition according to claim 1, wherein the amount of the pore-generating material is 0.1~95 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material).

4. The composition according to claim 1, wherein the siloxane-based resin precursor is selected from the group consisting of hydrogen silsesquioxane, an alkyl silsesquioxane, an aryl silsesquioxane and a copolymer thereof.

5. The composition according to claim 1, wherein the siloxane-based resin precursor is prepared by hydrolysis and polycondensation of at least one cyclic siloxane based monomer selected from the group consisting of compounds represented by Formula 1 below:



(1)

wherein R^1 and R^2 are each independently a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, X is a halogen atom or a C_{1-5} alkoxy group, r is an integer of from 0 to 10, s is an integer of from 1 to 3 and t is an integer of from 3 to 8,

and at least one silane-based monomer selected from the group consisting of compounds represented by Formulae 2 to 4 below:

$$SiX^1X^2X^3X^4 \quad (2)$$

wherein X^1, X^2, X^3 and X^4 are each independently a halogen atom or a C_{1-5} alkoxy group;

$$R^1SiX^1X^2X^3 \quad (3)$$

wherein R^1 is a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X^1, X^2 and X^3 are as defined above; and

$$R^1R^2SiX^1X^2 \quad (4)$$

wherein R^1 and R^2 are each independently a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X^1 and X^2 are as defined above,

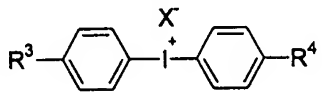
using an acid or base catalyst and water in an organic solvent.

6. The composition according to claim 5, wherein the acid catalyst is selected from the group consisting of hydrochloric acid, nitric acid, benzene sulfonic acid, oxalic acid and formic acid, and the base catalyst is selected from the group consisting of potassium hydroxide, sodium hydroxide, triethylamine, sodium bicarbonate and pyridine.

7. The composition according to claim 5, wherein the equivalence ratio of the water used during the hydrolysis and condensation to reactive groups of the monomers is in the range of 1.0~100.0, and wherein the hydrolysis and condensation are carried out at a temperature of about 0~200°C for 1~100 hours.

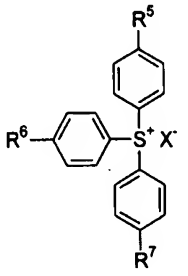
8. The composition according to claim 1, wherein the condensation catalyst generator is a photoacid generator or photobase generator capable of generating an acid or base by light exposure or heating.

9. The composition according to claim 8, wherein the photoacid generator is at least one compound selected from the group consisting of compounds represented by Formulae 5 to 7 below:



(5)

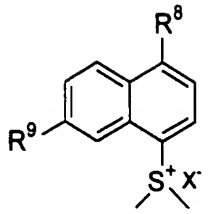
wherein R^3 and R^4 are each independently a hydrogen atom, a $C_{1\sim6}$ alkyl group, a $C_{3\sim10}$ cycloalkyl group or a $C_{6\sim15}$ aryl group, and X is a sulfonate derivative;



(6)

wherein R^5, R^6 and R^7 are each independently a hydrogen atom, a $C_{1\sim6}$ alkyl group, a $C_{3\sim10}$ cycloalkyl group or a $C_{6\sim15}$ aryl group, and X is a sulfonate

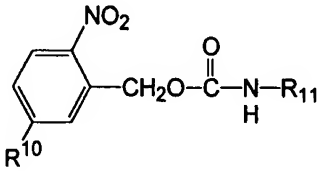
derivative; and



(7)

wherein R^8 and R^9 are each independently a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X is a sulfonate derivative.

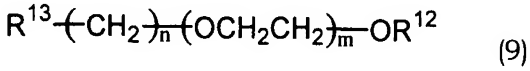
10. The composition according to claim 8, wherein the photobase generator is a compound represented by Formula 8 below:



(8)

wherein R^{10} is a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and R^{11} is a cyclohexyl, naphthyl, adamantyl, nitrophenyl or methoxyphenyl group.

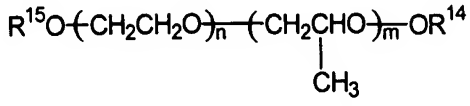
11. The composition according to claim 1, wherein the pore-generating material is at least one compound selected from the group consisting of compounds represented by Formulae 9 to 13 below:



(9)

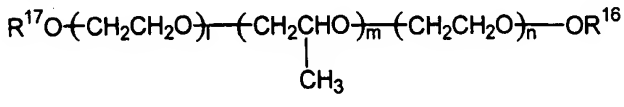
wherein R^{12} and R^{13} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Sir^1r^2r^3$ (in which r^1, r^2 and r^3 are each

independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), m is an integer of from 20 to 80, and n is an integer of from 2 to 200;



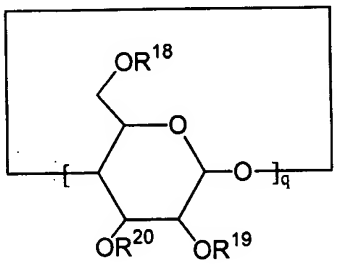
(10)

wherein R^{14} and R^{15} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Sir^1r^2r^3$ (in which r^1, r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), and m and n are as defined above;



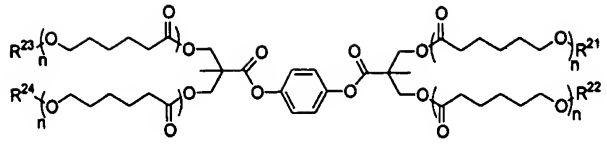
(11)

wherein R^{16} and R^{17} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Sir^1r^2r^3$ (in which r^1, r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), l is an integer of from 2 to 200, and m and n are as defined above;



(12)

wherein R^{18}, R^{19} and R^{20} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Sir^1r^2r^3$ (in which r^1, r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), and q is an integer of from 5 to 8; and



(13)

wherein R^{21}, R^{22}, R^{23} and R^{24} are each independently a hydrogen atom, a $C_{2\text{-}30}$ acyl group, a $C_{1\text{-}20}$ alkyl group or $-Sir^1r^2r^3$ (in which r^1, r^2 and r^3 are each independently a hydrogen atom, a $C_{1\text{-}6}$ alkyl group, a $C_{1\text{-}6}$ alkoxy group or a $C_{6\text{-}20}$ aryl group), and n is an integer of from 2 to 200.

12. The composition according to claim 1, wherein the solvent is an aromatic hydrocarbon-based solvent, a ketone-based solvent, an ether-based solvent, an acetate-based solvent, an alcohol-based solvent, an amide-based solvent, γ-butyrolactone, a silicon solvent, or a mixture thereof.

13. The composition according to claim 1, wherein an amount of the solvent is 20~99.9 parts by weight, based on 100 parts by weight of the composition (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material + the solvent).

14. A method for forming a porous dielectric film, comprising the steps of:

(1) coating the composition according to claim 1 onto a substrate to form a thin film;

(2) exposing the thin film to light and low temperature curing the exposed thin film at a temperature of about 50~150°C; and

(3) heating the thin film at a temperature higher than the decomposition temperature of the pore-generating material.

15. The method according to claim 14, wherein the thin film is applied by spin coating, dip coating, spray coating, flow coating or screen printing.

16. The method according to claim 14, wherein the light exposure is carried out using X-ray, ion beam or electron beam.

17. A method for forming a pattern of a porous dielectric film, comprising the steps of:

(1) coating the composition according to claim 1 onto a substrate to form a thin film;

(2) exposing the thin film to light through a patterned mask and low temperature curing the exposed thin film at a temperature of about 50~150°C;

(3) removing unexposed regions with a developing agent to form a negative pattern; and

(4) heating the negative pattern at a temperature higher than the decomposition temperature of the pore-generating material.

18. The method according to claim 17, wherein the thin film is applied by spin coating, dip coating, spray coating, flow coating or screen printing.

19. The method according to claim 17, wherein the light exposure is carried out using X-ray, ion beam or electron beam.

20. A porous dielectric film prepared by the method according to claim 14.

21. A pattern of a porous dielectric film prepared by the method according to claim 17

22. A porous dielectric film prepared from a composition comprising:

(i) a siloxane-based resin precursor;

(ii) a condensation catalyst generator;

(iii) a pore-generating material; and

(iv) a solvent for dissolving the components (i)~(iii).